AMENDMENTS TO THE CLAIMS

1. (currently amended) A method for producing a spherical or grain-shaped semiconductor element for use in a solar cell, comprising the steps of:

applying a conductive back contact layer directly onto a spherical or grain-shaped substrate core,

the conductive back contact layer comprising one or more conductive materials selected from the group consisting of molybdenum, molybdenum-gallium, tungsten, vanadium, transparent conductive oxide (TCO), a polymer having conductive particles, an intrinsic conductive polymer, and wherein the conductive back contact layer optionally further comprises a gallium layer over the conductive material,

and the substrate core comprising soda-lime glass;

applying a first precursor layer comprising copper or copper gallium to the conductive back contact layer;

applying a second precursor layer comprising indium; and

reacting the precursor layers with sulfur and/or selenium to form a I-III-VI compound semiconductor, by carrying out the reaction of the layer structure in vapor of the reaction element sulfur and/or selenium, or by carrying out the reaction of the layer structure in a melt of the reaction element sulfur and/or selenium, or carrying out the reaction of the layer structure in hydrogen compounds of the reaction element sulfur and/or selenium~~, carrying out the reaction in hydrogen compounds at or below atmospheric pressure~~.

2. (previously presented) The method according to claim 1, wherein the main constituent of the conductive back contact layer is molybdenum.

3. (previously presented) The method according to claim 2, wherein the conductive back contact layer contains up to 20% by weight of gallium in order to improve adhesion.

4. (currently amended) The method according to claim 1, comprising applying each of the layers by a PVD and/or CVD method.

5. (currently amended) The method according to one claim 1, comprising ~~alloys on a layer structure comprising~~ alloying the precursor layers at a temperature of T > 220 °C [> 428 °F] prior to the reaction to form a I-III-VI compound semiconductor.

6. (currently amended) The method according to claim 1, comprising carrying out a treatment with a KCN solution after ~~reatcing~~ reacting the layer structure to form a I-III-VI compound semiconductor.

7. (previously presented) The method according to claim 1, comprising depositing a buffer layer after reacting the layer structure to form a I-III-VI compound semiconductor.

8. (previously presented) The method according to claim 1, comprising depositing a high-resistance ZnO layer and a low-resistance ZnO layer after reacting the layer structure to form a I-III-VI compound semiconductor.

9. (previously presented) The method according to claim 8, comprising depositing the buffer layer and/or the high-resistance and the low-resistance layers by a PVD or CVD method.

10. (currently amended) A spherical or grain-shaped semiconductor element for use in solar cells, ~~wherein the~~ comprising a semiconductor element has a spherical or grain-shaped substrate core that comprises soda-lime glass and is directly coated at least with one back contact layer comprising one or more conductive materials selected from the group consisting of molybdenum, molybdenum-gallium, tungsten, vanadium, transparent conductive oxide (TCO), a polymer having conductive particles, an intrinsic conductive polymer, and wherein

the conductive back contact layer optionally further comprises a gallium layer over the conductive material , and with a ~~one~~ I-III-VI compound semiconductor.

11. (currently amended) The semiconductor element according to claim 10, wherein the diameter of the substrate core is in the ~~order of magnitude~~ range of 0.1 mm to 1 mm.

12. (previously presented) The semiconductor element according to claim 10, wherein the thickness of the back contact layer is in the range of 0.1 µm to 1 µm.

13. (previously presented) The semiconductor element according to claim 10, wherein the I-III-VI compound semiconductor layer comprising a compound selected from the group consisting of copper indium sulfides, copper indium diselenides, copper indium gallium sulfides, and copper indium gallium diselenides.

14. (previously presented) The semiconductor element according to claim 10, wherein the thickness of the I-III-VI compound semiconductor layer is in the range of 1 µm to 3 µm.

15. (previously presented) The semiconductor element according to claim 10, wherein the semiconductor element has a buffer layer above the I-III-VI compound semiconductor layer .

16. (previously presented) The semiconductor element according to claim 15, wherein the buffer layer comprises a material selected from the group consisting of CdS, ZnS, ZnSe, ZnO, indium selenium compounds or indium sulfur compounds.

17. (previously presented) The semiconductor element according to claim 15, wherein the thickness of the buffer layer is in the range of 20 nm to 200 nm.

18. (previously presented) The semiconductor element according to claim 10, wherein the semiconductor element has a high-resistance and a low-resistance ZnO layer above the I-III-VI compound semiconductor layer.

19. (currently amended) The semiconductor element according to claim 18, wherein the thickness of the high-resistance layer is in the range of 10 nm to 100 nm, whereas the thickness of the low-resistance ZnO layer is in the ~~order of magnitude~~ range of 0.1 µm to 2 µm.

20. (previously presented) The semiconductor element according to claim 10, wherein the semiconductor element is produced by a method according to claim 1.

21. (withdrawn) A method for producing a solar cell having integrated spherical or grain-shaped semiconductor elements, comprising the steps of:

incorporating several spherical or grain-shaped semiconductor elements into an insulating support layer, wherein the semiconductor elements protrude from the surface of the support layer on at least one side of the support layer, and the semiconductor elements each comprise a spherical or grain-shaped substrate core that is coated at least with one conductive back contact layer and with one I-III-VI compound semiconductor layer ;

removing parts of the semiconductor elements on one side of the support layer so that a surface of the conductive back contact layer of the semiconductor elements is exposed;

applying a back contact layer onto a side of the support layer on which parts of the semiconductor elements have been removed; and

applying a front contact layer onto the side of the support layer on which no semiconductor elements have been removed.

22. (withdrawn) The method according to claim 21, comprising, in addition to parts of the semiconductor elements, removing part of the support layer.

23. (withdrawn) The method according to claim 21, comprising applying the semiconductor elements onto the support layer by scattering, dusting and/or printing and subsequently incorporated the semiconductor elements into the support layer.

24. (withdrawn) The method according to claim 21, comprising configuring the support layer as a matrix with recesses into which the semiconductor elements are incorporated.

25. (withdrawn) The method according to claim 21, comprising incorporating the semiconductor elements into the support layer by a heating and/or pressing procedure.

26. (withdrawn) The method according to claim 21, comprising removing the semiconductor elements and/or the support layer by grinding, polishing, etching, thermal energy input or a photolithographic process.

27. (withdrawn) The method according to claim 21, comprising depositing the back contact layer and/or the front contact layer by a PVD or CVD method or by another method adapted to the material of the layer in question.

28. (withdrawn) A solar cell having integrated spherical or grain-shaped semiconductor elements, comprising:

an insulating support layer into which the spherical or grain-shaped semiconductor elements are incorporated, wherein the semiconductor elements protrude from the layer on at least one side of the support layer, and the semiconductor elements each comprising a spherical or grain-shaped substrate core that is coated at least with one conductive back contact layer and with one I-III-VI compound semiconductor layer;

a back contact layer on one side of the support layer, wherein a plurality of semiconductor elements on this side of the support layer have a surface that is free of I-III-VI compound semiconductors; and

a front contact layer on the side of the support layer on which the semiconductor elements do not have a surface that is free of I-III-VI compound semiconductors.

29. (withdrawn) The solar cell according to claim 28, produced by a method comprising the steps of:

incorporating several spherical or grain-shaped semiconductor elements into an insulating support layer, wherein the semiconductor elements protrude from the surface of the support layer on at least one side of the support layer, and the semiconductor elements each comprise a spherical or grain-shaped substrate core that is coated at least with one conductive back contact layer and with one I-III-VI compound semiconductor layer;

removing parts of the semiconductor elements on one side of the support layer so that a surface of the conductive back contact layer of the semiconductor elements is exposed;

applying a back contact layer onto a side of the support layer on which parts of the semiconductor elements have been removed; and

applying a front contact layer onto the side of the support layer on which no semiconductor elements have been removed.

30. (withdrawn) The solar cell according to claim 28, wherein the insulating support layer comprises a thermoplastic material.

31. (withdrawn) The solar cell according to claim 28, wherein the support layer comprises a polymer selected from the group consisting of epoxides, polycarbonates, polyesters, polyurethanes, polyacrylics, and polyimides.

32. (withdrawn) The solar cell according to claim 28, wherein the spherical or grain-shaped semiconductor elements are semiconductor elements, wherein the semiconductor element has a spherical or grain-shaped substrate core comprising soda-lime glass and coated at least with one back contact layer comprising molybdenum and one I-III-VI compound semiconductor.

33. (withdrawn) The solar cell according to claim 28, wherein the semiconductor elements are coated with a I-III-VI compound semiconductor selected from the group consisting of copper indium diselenides, copper indium disulfides, copper indium gallium diselenides and copper indium gallium diselenide disulfides.

34. (withdrawn) The solar cell according to claim 28, wherein the front contact layer comprises a conductive material.

35. (withdrawn) The solar cell according to claim 34, wherein the front contact layer comprises a transparent conductive oxide (TCO).

36. (withdrawn) The solar cell according to claim 28, wherein the back contact layer comprises a conductive material.

37. (withdrawn) The solar cell according to claim 36, wherein the back contact layer comprises a metal, a transparent conductive oxide (TCO) or a polymer having conductive particles.

38. (withdrawn) The solar cell according to claim 37, wherein the back contact layer comprises a polymer selected from the group consisting of epoxy resins, polyurethanes and/or polyimides having conductive particles selected from the group consisting of carbon, indium, nickel, molybdenum, iron, nickel chromium, silver, aluminum and corresponding alloys or oxides.

39. (withdrawn) The solar cell according to claim 38, characterized in that wherein the back contact layer comprises an intrinsic conductive polymer.

40. (withdrawn) A photovoltaic module, comprising at least one solar cell according to claim 28.

41. (previously presented) The semiconductor element according to claim 10, wherein the diameter of the substrate core is in the order of magnitude approximately 0.2 mm.

42. (new) The method according to claim 1, wherein the reaction of the layer structure is carried out in vapor of the reaction element sulfur and/or selenium or in hydrogen compounds of the reaction element sulfur and/or selenium at atmospheric pressure or at a pressure lower than atmospheric pressure.

43. (new) The semiconductor element according to claim 10, wherein the main constituent of the back contact layer is molybdenum.